AVTECH ELECTROSYSTEMS LTD.

NANOSECOND WAVEFORM ELECTRONICS
SINCE 1975

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INSTRUCTIONS

MODEL AVO-7B2-C-P-WB

0 to 220 Volt, 0 to 44 Amp

500 Hz PULSE GENERATOR

SERIAL NUMBER: _____

WARRANTY

Avtech Electrosystems Ltd. warrants products of its manufacture to be free from defects in material and workmanship under conditions of normal use. If, within one year after delivery to the original owner, and after prepaid return by the original owner, this Avtech product is found to be defective, Avtech shall at its option repair or replace said defective item. This warranty does not apply to units which have been dissembled, modified or subjected to conditions exceeding the applicable specifications or ratings. This warranty is the extent of the obligation assumed by Avtech with respect to this product and no other warranty or guarantee is either expressed or implied.

TECHNICAL SUPPORT

Phone: 613-226-5772 or 1-800-265-6681
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World Wide Web: http://www.avtechpulse.com

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Manual Reference: /fileserver1/officefiles/instructword/avo-7b&c/AVO-7B2-C-P-WB,edition1.sxw.
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INTRODUCTION

The AVO-7B2-C-P-WB is a high performance instrument capable of generating voltage pulses of 0 to +220V into loads of 5 Ohms or higher (i.e., 44 Amps maximum) at repetition rates up to 500 Hz. The pulse width is variable from 1 ns to 5 us, and the duty cycle may be as high as 0.25%. Rise and fall times are fixed at less than 0.5 us. The AVO-7B2-C-P-WB includes an internal trigger source, but it can also be triggered by an external source.

The AVO-7B2-C-P-WB consists of two parts, the mainframe and the output module. The load is connected to the OUT connector on the output module.

This instrument is intended for use in research and development laboratories.

ORIGINAL QUOTATION & SPECIFICATIONS

Date: Thu, 24 Jun 2004 13:45:04 -0400
From: "Dr. Michael J. Chudobiak"
To: walt.deronde@aeroflex-weinschel.com
Subject: Avtech pulse generator quote

To: Walt Deronde
Aeroflex-Weinschel
301-846-9222 x344
walt.deronde@aeroflex-weinschel.com

Walt,

Following your recent inquiry, I am pleased to quote as follows:

Quote number: 12138.01

Model number: AVO-7B2-C-P-WB

Amplitude: 0 to +220V, to loads of 5 Ohms or higher (44 Amps maximum)

Pulse width: 1 to 5 us, adjustable

Rise and fall times: < 0.5 us

PRF: 500 Hz maximum

Maximum duty cycle: 0.25%

Output connector: BNC

Output module style: as per the AVO-7B2-C-P-WA

Mainframe dimensions: 3.9" x 17" x 14.8"

Output module dimensions: 6" x 6" x 9"

Prime power: 100-240 V, 50-60 Hz.

Price: $6218 US each, FOB destination.

Estimated delivery: 60-75 days after receipt of order.

Quote number: 12138.02

Model number: AVO-7B2-B-P-WB

Description: as per the AVO-7B2-C-P-WB, but with the addition of IEEE488.2 GPIB and RS-232 computer control ports. See http://www.avtechpulse.com/gpib/ for details.

Price: $8719 US each, FOB destination.

Estimated delivery: 60-75 days after receipt of order.

Please call or email me if I can be of further assistance.

Regards,
Dr. Michael J. Chudobiak
Chief Engineer

--- Avtech Electrosystems Ltd. ---------- since 1975 ---

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Nanosecond Waveform Generators
for general purpose, R&D and OEM applications

Pulse Generators - Laser Diode Drivers - Pulse Amplifiers
Impulse Generators - Current Pulsers - Delay Generators - Splitters
Function Generators - Monocycle Generators - Frequency Dividers + more!

INSTALLATION

VISUAL CHECK

After unpacking the instrument mainframe and the transformer module, examine to ensure that they have not been damaged in shipment. Visually inspect all connectors, knobs, and handles. Confirm that a power cord and an instrumentation manual (this manual), are with the instrument. If the instrument has been damaged, file a claim immediately with the company that transported the instrument.

POWER RATINGS

This instrument is intended to operate from 100 - 240 V, 50 - 60 Hz.

The maximum power consumption is 90 Watts. Please see the “FUSES” section for information about the appropriate AC and DC fuses.

This instrument is an “Installation Category II” instrument, intended for operation from a normal single-phase supply.

CONNECTION TO THE POWER SUPPLY

An IEC-320 three-pronged recessed male socket is provided on the back panel for AC power connection to the instrument. One end of the detachable power cord that is supplied with the instrument plugs into this socket. The other end of the detachable power cord plugs into the local mains supply. Use only the cable supplied with the instrument. The mains supply must be earthed, and the cord used to connect the instrument to the mains supply must provide an earth connection. (The supplied cord does this.) The table below describes the power cord that is supplied with this instrument, depending on the destination region:

Destination Region	Description	Volex (http://www.volex.com) Part Number	Newark (http://www.newark.com) Stock Number
Continental Europe	European CEE 7/7 “Schuko” 230V, 50Hz	17850-C3-326	44F1841
United Kingdom	BS 1363, 230V, 50Hz	17962-C3-10	84F1025
Switzerland	SEV 1011, 230V, 50Hz	2102H-C3-10	93F2452
Israel	SI 32, 220V, 50Hz	2115H-C3-10	04F1115
North America, and all other areas	NEMA 5-15, 120V, 60 Hz	17250-B1-10	36F1255

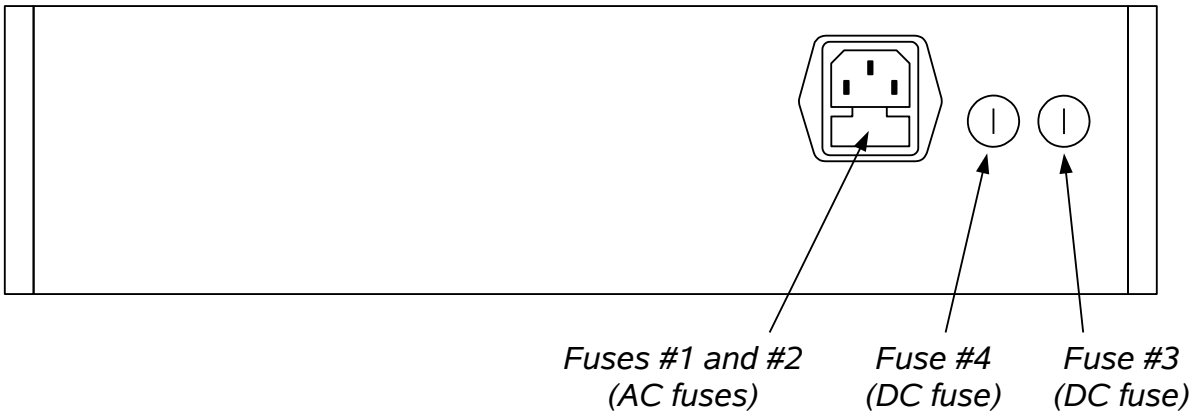
ENVIRONMENTAL CONDITIONS

This instrument is intended for use under the following conditions:

1. indoor use;
2. altitude up to 2 000 m;
3. temperature 5 °C to 40 °C;
4. maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C;
5. Mains supply voltage fluctuations up to ±10 % of the nominal voltage;
6. no pollution or only dry, non-conductive pollution.

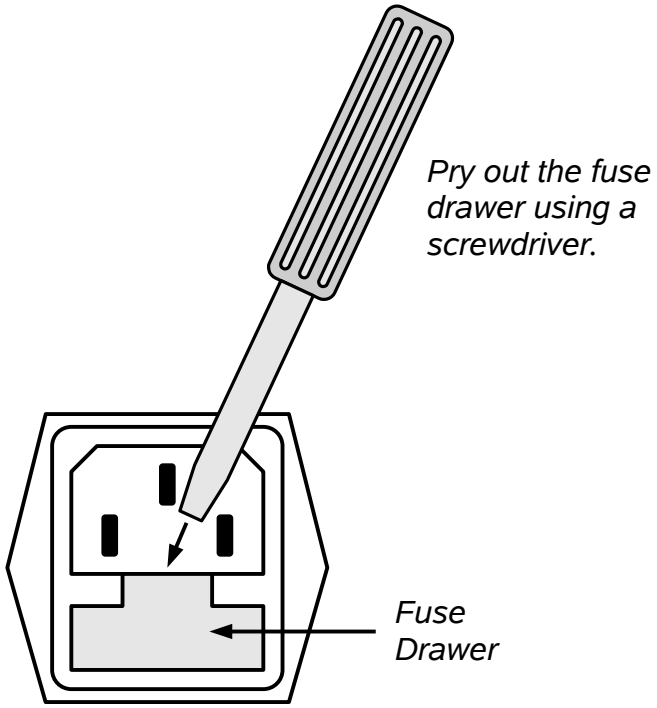
FUSES

This instrument contains four fuses. All are accessible from the rear-panel. Two protect the AC prime power input, and two protect the internal DC power supplies. The locations of the fuses on the rear panel are shown in the figure below:



AC FUSE REPLACEMENT

To physically access the AC fuses, the power cord must be detached from the rear panel of the instrument. The fuse drawer may then be extracted using a small flat-head screwdriver, as shown below:



DC FUSE REPLACEMENT

The DC fuses may be replaced by inserting the tip of a flat-head screwdriver into the fuse holder slot, and rotating the slot counter-clockwise. The fuse and its carrier will then pop out.

FUSE RATINGS

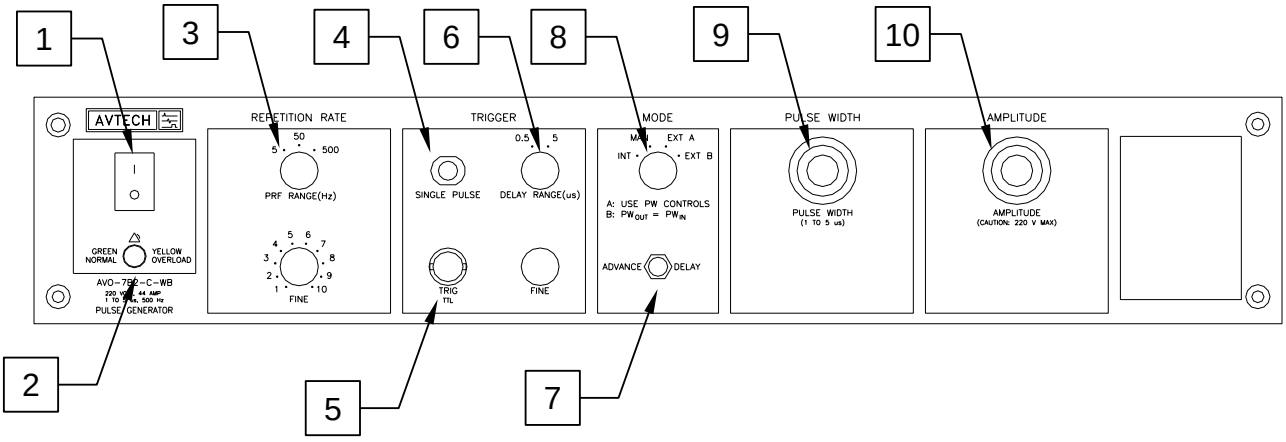
The following table lists the required fuses:

Fuses	Nominal Mains Voltage	Rating	Case Size	Manufacturer's Part Number (Wickmann)	Distributor's Part Number (Digi-Key)
#1, #2 (AC)	115 V	0.8A, 250V, Time-Delay	5×20 mm	1950800000	WK5046-ND
	230 V	0.5A, 250V, Time-Delay	5×20 mm	1950500000	WK5041-ND
#3 (DC)	N/A	2.5A, 250V, Time-Delay	5×20 mm	1951250000	WK5058-ND
#4 (DC)	N/A	2.0A, 250V, Time-Delay	5×20 mm	1951200000	WK5057-ND

The fuse manufacturer is Wickmann (http://www.wickmann.com/).

Replacement fuses may be easily obtained from Digi-Key (http://www.digikey.com/) and other distributors.

FRONT PANEL CONTROLS



1) POWER Switch. This is the main power switch. When turning the instrument on, there may be a delay of several seconds before the instrument appears to respond.

2) OVERLOAD Indicator. When the instrument is powered, this indicator is normally green, indicating normal operation. If this indicator is yellow, an internal automatic overload protection circuit has been tripped. If the unit is overloaded (by operating at an exceedingly high duty cycle or by operating into a very low impedance), the protective circuit will disable the output of the instrument and turn the indicator light yellow. The light will stay yellow (i.e. output disabled) for about 5 seconds after which the instrument will attempt to re-enable the output (i.e. light green) for about 1 second. If the overload condition persists, the output will be disabled again (i.e. light yellow) for another 5 seconds. If the overload condition has been removed, the instrument will resume normal operation.

   This overload indicator may flash yellow briefly at start-up. This is not a cause for concern.

3) PRF Range Switch and Vernier. This switch sets the pulse repetition frequency (PRF) range of the internal oscillator. The marked value of each position is the upper limit of the range, approximately. The vernier dial directly below the switch varies the PRF within the set range.

4) SINGLE PULSE Push Button. The "SINGLE PULSE" push button will trigger the instrument manually for one cycle of output, when the "MODE" switch is in the "MAN" position. Otherwise, the push button has no effect.

5) TRIG Connector. When the "MODE" switch is in the "EXT" position, this connector is an input. The external trigger (50 ns or wider, TTL levels) is applied to this connector.

   When operating in the "INT" mode, this connector is an output. A SYNC output is generated on this connector, to synchronize oscilloscopes or other measurement

systems.

6) Delay Range Switch and Vernier. This switch and one-turn dial sets the delay between the main output and the TRIG output. The marked value of each switch position is the upper limit of the range, approximately. The vernier dial directly below the switch varies the delay within the set range.

7) ADVANCE/DELAY Switch. With this switch in the DELAY position, the leading edge of the output pulse precedes the leading edge of the TRIG output. When in the ADVANCE position, the leading edge of the TRIG output precedes the leading edge of the main output.

8) MODE Switch. In the "INT" position the instrument is internally triggered and the TRIG connector provides a SYNC output which allows one to trigger other instruments, such as oscilloscopes.

   In the "MAN" position a single pulse can be generated by pressing the "SINGLE PULSE" push button. The TRIG connector is not used in this mode.

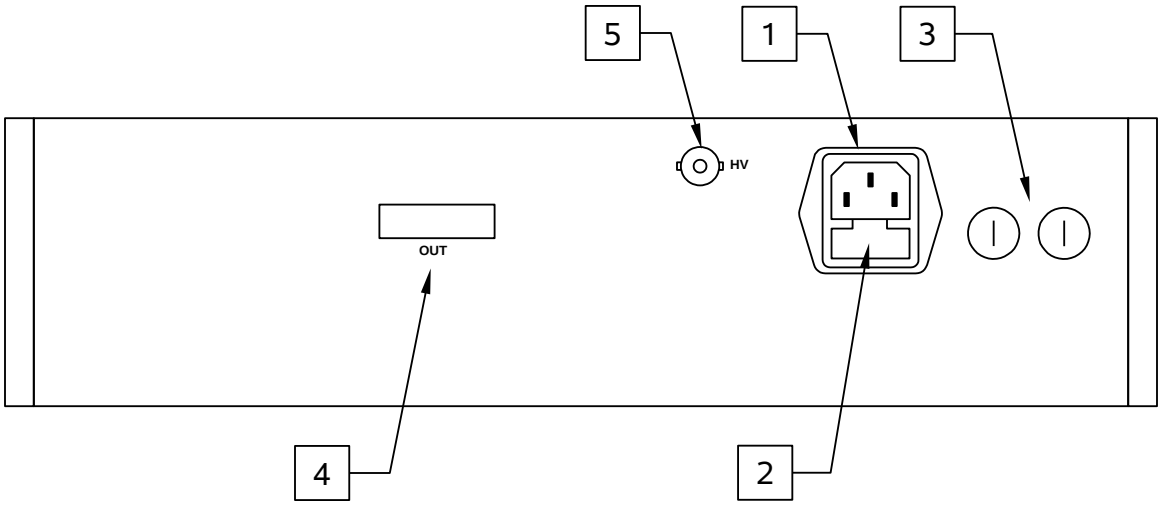
   In the "EXT A" position the instrument is triggered by a TTL-level pulse on the TRIG connector. The output parameters (pulse width, delay, and amplitude) are determined by the front panel settings.

   In the "EXT B" position the instrument is triggered by a TTL-level pulse on the TRIG connector. The output pulse occurs with nominally zero delay, and the output pulse width is approximately equal to the input pulse width. The amplitude is controlled by the front panel settings.

9) PULSE WIDTH Controls. This switch and ten-turn dial set the pulse width of the the main output. The marked value of each switch position is the upper limit of the range, approximately. The vernier dial directly below the switch varies the delay within the set range.

10) AMPLITUDE Controls. This ten-turn dial provides continuously variable control of the peak amplitude of the main output from 0 to the full-scale range value.

MAINFRAME REAR PANEL CONTROLS



1. AC POWER INPUT. An IEC-320 C14 three-pronged recessed male socket is provided on the back panel for AC power connection to the instrument. One end of the detachable power cord that is supplied with the instrument plugs into this socket.

2. AC FUSE DRAWER. The two fuses that protect the AC input are located in this drawer. Please see the “FUSES” section of this manual for more information.

3. DC FUSES. These two fuses protect the internal DC power supplies. Please see the “FUSES” sections of this manual for more information.

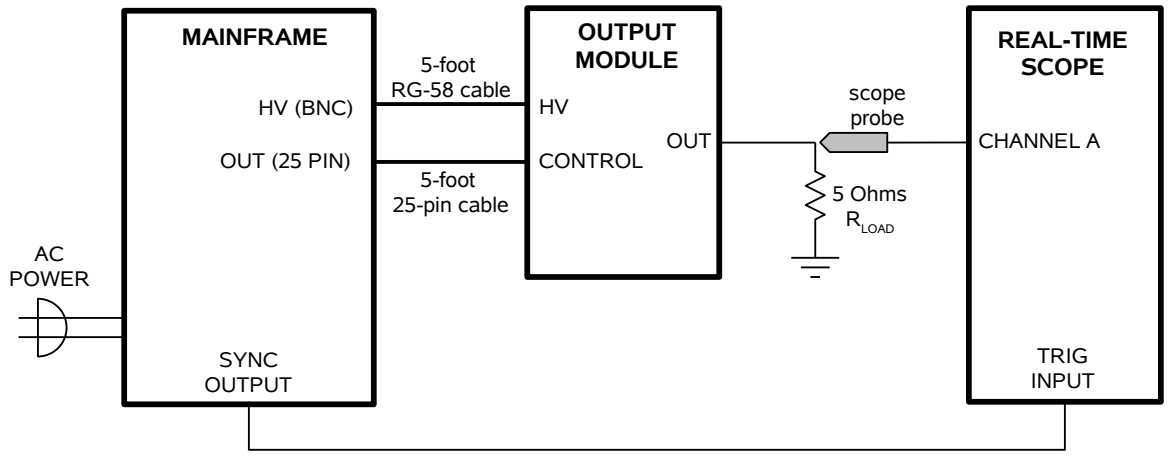
4. OUT. The 25-pin cable from the output module is connected to this connector.

5. HV BNC Connector. The shielded RG-58 cable from the output module is connected to this connector. This carries the high-voltage power supply (up to +245V) to the output module.

   ⚠ Caution: Voltages as high as +245V may be present on the center conductor of this output connector. Avoid touching this conductor. Connect to this connector using standard coaxial cable, to ensure that the center conductor is not exposed.

GENERAL INFORMATION

BASIC TEST ARRANGEMENT



The equipment should be connected in the general fashion shown above. The output modules should always be connected to the mainframe BEFORE power is applied.

The output is supplied through the “OUT” BNC connector on the output module.

This instrument is designed to supply up to 44 Amperes to a maximum load voltage of 220 volts. Factory tests are conducted with a 5.0 Ohm load capable of dissipating at least 25 watts. Higher load resistance values may be used but the output voltage will be limited to 220 Volts.

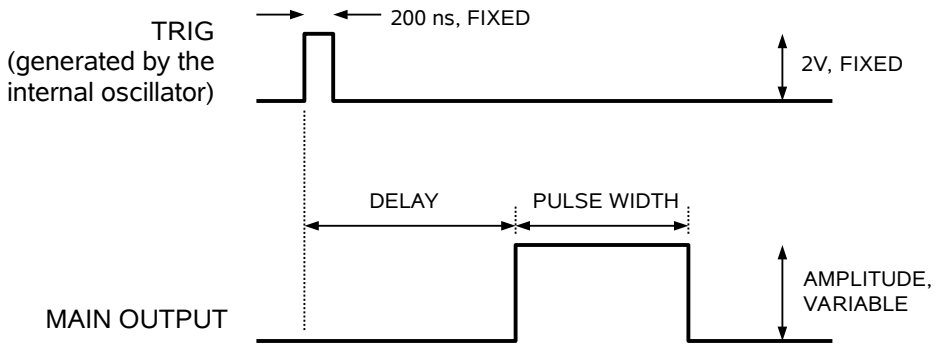
BASIC PULSE CONTROL

This instrument can be triggered by its own internal clock or by an external TTL trigger signal. When triggered internally, two mainframe output channels respond to the trigger: OUT and SYNC.

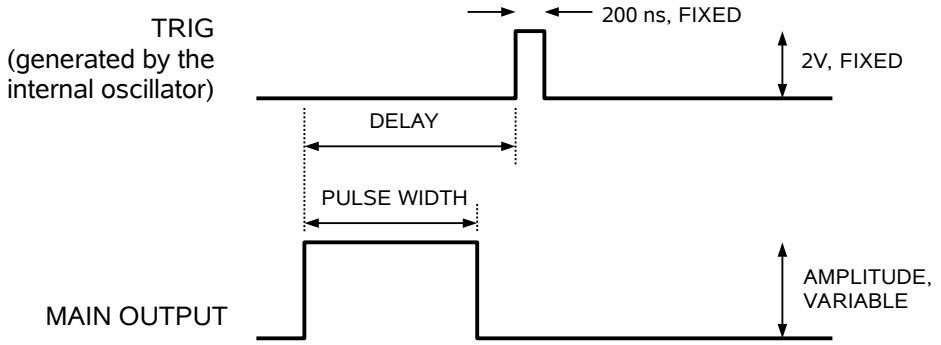
- OUT. This is the main output. The maximum output voltage is 220V.

- TRIG. The TRIG pulse is a fixed-width TTL-level reference pulse used to trigger oscilloscopes or other measurement systems.

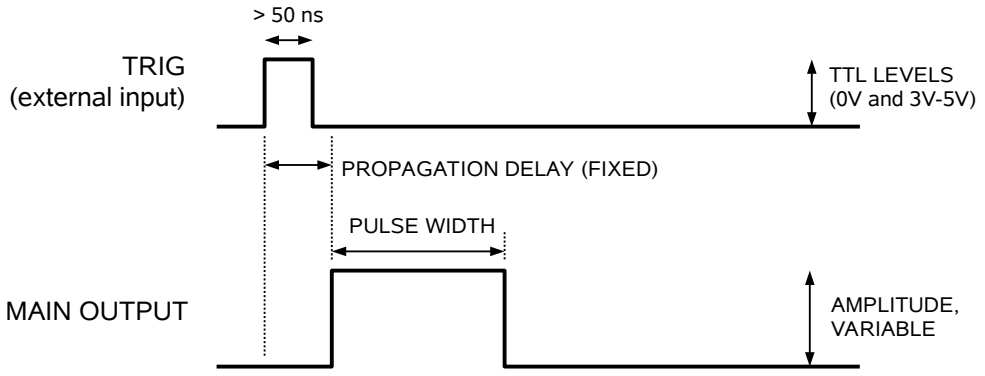
When the ADVANCE/DELAY switch is set to “ADVANCE”, the TRIG output precedes the main output. These pulses are illustrated below:



When the ADVANCE/DELAY switch is set to “DELAY”, the TRIG output occurs after the main output. This illustrated below:



When triggered externally, the TRIG connector acts as an input. The delay controls do not function in this mode. This illustrated below:



LENZ’S LAW AND INDUCTIVE VOLTAGE SPIKES

This instrument is designed to pulse resistive and diode loads and will exhibit a large output spike when used to drive a load with significant inductance (as predicted by

LENZ'S LAW). For this reason the load should be connected to the output using low inductance leads (as short as possible).

The voltage developed across an inductance L (in Henries), when the current is changing at a rate given by dI_{LOAD} / dt (in Amps/sec), is: $V_{SPIKE} = L\ dI_{LOAD} / dt$.

MECHANICAL INFORMATION

TOP COVER REMOVAL

If necessary, the interior of the instrument may be accessed by removing the four Phillips screws on the top panel. With the four screws removed, the top cover may be slid back (and off).

Always disconnect the power cord before opening the instrument.

There are no user-adjustable internal circuits. For repairs other than fuse replacement, please contact Avtech (info@avtechpulse.com) to arrange for the instrument to be returned to the factory for repair.

⚠ Caution: High voltages are present inside the instrument during normal operation. Do not operate the instrument with the cover removed.

ELECTROMAGNETIC INTERFERENCE

To prevent electromagnetic interference with other equipment, all used outputs should be connected to shielded loads using shielded coaxial cables. Unused outputs should be terminated with shielded coaxial terminators or with shielded coaxial dust caps, to prevent unintentional electromagnetic radiation. All cords and cables should be less than 3m in length.

MAINTENANCE

REGULAR MAINTENANCE

This instrument does not require any regular maintenance.

On occasion, one or more of the four rear-panel fuses may require replacement. All fuses can be accessed from the rear panel. See the “FUSES” section for details.

CLEANING

If desired, the interior of the instrument may be cleaned using compressed air to dislodge any accumulated dust. (See the “TOP COVER REMOVAL” section for instructions on accessing the interior.) No other cleaning is recommended.

PERFORMANCE CHECK SHEET